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Policy Research Department
The World Bank
July 1993
WPS 1159

Stock Market Development and Financial Intermediary Growth

A Research Agenda

Aslı Demirgüç-Kunt
and
Ross Levine

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This paper — a product of the Finance and Private Sector Development Division, Policy Research Department — is part of a larger effort in the department to evaluate the development and role of emerging stock markets. The research outlined here will be funded by the Bank's Research Support Budget under research project "Stock Market Development and Financial Intermediary Growth" (RPO 678-37). Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Paulina Sintim-Aboagye, room N9-059, extension 38526 (July 1993, 35 pages).

Empirical evidence suggests that financial services — such as mobilizing savings, managing risk, allocating resources, and facilitating transactions — influence and are influenced by economic development. And financial crises — widespread bank failures, the collapse of stock markets — can impede and even reverse economic advances.

With this in mind, the World Bank made special efforts in the 1980s to help countries improve their financial systems and cope with financial crises that threatened economic prosperity. Bank programs focused on core financial themes (loosening up interest rates, reducing government involvement in credit allocation, rationalizing taxes on financial intermediaries) and on managing bank failures, rehabilitating insolvent banks, and training bank managers and supervisors.

Recently, Bank programs have stressed the development of capital markets, especially stock markets, but little research has been done in measuring the level of stock market development or understanding the relationship between the development of stock markets and the functioning of financial intermediaries.

Demirgüç-Kunt and Levine did some preliminary research on these issues and suggest further topics for research.

They propose different empirical indicators of "stock market development." They also suggest how to use these indicators to help evaluate stock market development policies.

They find that the relationship between the development of stock markets and the functioning of financial intermediaries may be complementary.

Stock Market Development and Financial Intermediary Growth
A Research Agenda

Asli Demirgüç-Kunt and Ross Levine

I. INTRODUCTION

Empirical evidence suggests that financial services - mobilizing savings, managing risk, allocating resources, and facilitating transactions - importantly influence and are importantly influenced by economic development.[1] A larger literature demonstrates that financial crises - widespread bank failures, stock market collapses, etc. - can impede and even reverse economic advances.[2] In light of these observations and experience, the World Bank in the 1980s began devoting an increasing amount of effort toward (1) improving the financial systems of countries in an attempt to stimulate economic development and (2) coping with financial crises that threaten economic prosperity. Throughout this period, World Bank programs focussed on core financial themes - loosening interest rate controls, reducing Government involvement in credit allocation, and rationalizing the taxation of financial intermediaries - as well as on managing banking failures, rehabilitating insolvent banks, and training bank managers and supervisors.

More recently, World Bank Group programs have stressed the development of capital markets in general and stock markets in particular. Yet, there exists very little work on (1) measuring the level of stock market development and (2) comprehending the relationship between stock market development and the functioning of financial intermediaries. This paper presents the results of some preliminary research on these issues and outlines a broader research agenda for future work. Section II of the paper discuses the research questions that are addressed and their relevance for World Bank operations. Section III (a) describes the methodology and data that we use and construct,

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[1] See Goldsmith (1969), McKinnon (1973), and King and Levine (1993a,b).

[2] See, for example, Dornbusch and Reynoso (1989).

and (b) presents some preliminary findings. Finally, the last section summarizes and concludes.

II. PURPOSES AND WORLD BANK OPERATIONS

This paper sets out a research agenda that has two major purposes: first, we develop an extensive assortment of measures of stock market development in developing countries. Analysts have neither a common concept nor a common measure of stock market development. Consequently, we plan to construct and compare a broader collection of stock market development indicators for more countries than any previous study. Second, using these measures, we explore the interactions between stock market development and the evolution and functioning of financial intermediaries. We hope to establish a set of empirical regularities regarding stock market development and financial intermediary growth that will motivate, challenge, and guide future theoretical and empirical work.

The output from this research has implications for World Bank operations. First, the stock market development indicators help in assessing the financial sector needs of those countries for which we have stock market data. The indicators help quantify which emerging market countries have the most "underdeveloped" markets. Second, these measures are useful metrics by which to judge policies designed to facilitate stock market development in these and other countries. It should prove helpful to have quantifiable methods of measuring whether capital market development projects are successful or not. Third, a comprehensive view of financial sector reform incorporates the broad set of financial intermediaries, stock markets, as well as other components of capital markets. Thus, constructing measures of the level of stock market development is a pre-condition for a comprehensive empirical evaluation of *how* the financial sector - as a conglomeration of intermediaries and markets - influences economic development. Put differently, we need cross-country measures of stock market development to

evaluate whether a particular country's financial structure - its mix of financial institutions - seems different or similar to other countries at similar stages of development.

We pursue this last point in the second part of the research, where we will (a) examine the joint development of stock markets and financial intermediaries and (b) examine how stock market development alters the capital financing decisions of firms.

This study of the relationship between stock market development and financial intermediary activities highlights a fundamental question about the role of stock market development in financial sector reform and economic development. Many influential economists have argued that stock markets are relatively unimportant to economic development because firms do not raise much capital through stock markets. However, this criteria for evaluating the importance of well-functioning stock markets - the amount of capital raised through the stock market - may not be appropriate. If better developed stock markets help individuals to price and hedge risk more effectively, then judging stock markets by how much capital is raise through public offerings is an inappropriate metric.

This research agenda, however, does not internalize all of the benefits from developing a broad set of stock market development indicators. We do not plan to study under this research project how stock market development influences economic growth or the efficiency of firm production, nor do we plan to study the importance of stock markets in privatization or when countries are ready for stock market development. Nevertheless, the stock market development indicators that we are constructing will be crucial to future research that undertakes these operationally relevant questions. Thus, the output of this research will indirectly influence Bank operations by setting the stage for relevant future research.

III. METHODOLOGY AND PRELIMINARY EVIDENCE

A. Measures of Stock Market Development in Developing Countries

There is debate about whether stock markets necessarily play a positive role in developing countries and therefore some skepticism about whether the World Bank should encourage stock market development. Critics often claim that developing country stock markets are largely speculative, and that prices and their volatility cannot be explained by fundamentals because of poor information, ineffective regulation and supervision, high transactions costs, insufficient competition, and a dearth of informed investors. Furthermore, stock markets provide a vehicle for rapid inflows and outflows of capital which may destabilize financial systems. Thus, some argue that stock market development in developing countries may do more harm than good, leading to adverse real effects for capital formation, resource allocation, and welfare.

Nevertheless, the proponents of stock markets emphasize the importance of having a "developed" stock market in enhancing the efficiency of investment. A well-functioning stock market is expected to lead to a lower cost of equity capital for firms. Continuous adjustment of their share prices impose control on the investment behavior of companies. Better developed stock markets allow individuals to more effectively price and hedge risk. Finally, stock markets can attract foreign portfolio capital and increase domestic resource mobilization, expanding the resources available for investment in developing countries.

To address empirically the role of stock markets in promoting efficient investments, we need measures of stock market development. Defining and measuring the level of development of the stock market, however, is difficult. The level of stock market development (like the level of economic development) is a complex and multi-faceted concept. Nonetheless, when analysts and policy makers compare "emerging" to "developed" stock markets, they are comparing potentially quantifiable qualities. These traits include (1) *traditional characteristics* - market capitalization, the amount of new capital raised

through stock offerings, the number of listed companies, and turnover; (2) *institutional characteristics* - regulations, information disclosure and transparency rules, and trading costs; and (3) *asset pricing characteristics* - the efficiency with which the market prices risk and the degree of integration into world stock markets. These characteristics define the term "stock market development." This research seeks to construct, as comprehensively as possible, measures of these traditional, institutional, and asset pricing characteristics in an attempt to quantify the level of stock market development in developing countries. The following sections discuss the data sources and present a preliminary depiction of these indicators.

1. Traditional Indicators

Data needed to construct traditional indicators are readily available from International Finance Corporation's Emerging Markets Data Base. The most common indicators used to characterize the extent of development of emerging stock markets are the number of listed companies, total market capitalization divided by GDP, total value traded divided by GDP, and the turnover ratio. Table 1 provides 1988-1992 mean values of these traditional indicators for a sample of emerging stock markets. While useful, each of these measures has shortcomings. The number of listed companies and market capitalization may not accurately indicate the level of stock market development. Companies may list their stock on the exchange merely to benefit from tax advantages provided to listed firms. High ratios of total value traded to GDP may be reflect trading of only a small portion of the total listed stock on the exchange. A perhaps better indicator of stock market activity is the turnover ratio, which equals value traded divided by market capitalization. If more developed stock markets have greater activity, a higher turnover ratio indicates a higher degree of stock market development.

Tables 2a and 2b rank emerging markets according to their development level based on different indicators. Table 2c reports the correlations among these indicators. Although the rankings based on different indicators vary,

certain patterns emerge. According to the traditional indicators, Korea, Thailand, and Malaysia generally rank quite high in terms of their stock market development. Jordan and India are also ranked quite high. Mexico, Chile, Brazil, Portugal, and Turkey appear to follow. Nigeria and Colombia are countries with least developed stock markets. Zimbabwe and Pakistan are also ranked low by most of the indicators.

This research project will compile traditional indicators, expanding the sample of countries as well as the time period. Emerging Markets Data Base has information on 32 countries. For 20 of these countries (Taiwan-China, and countries listed in Table 1) IFC calculates representative indexes, selecting stocks based on trading activity and market size.[3] The data base also includes 12 countries, for which IFC does not calculate an index.[4] This research will investigate the traditional indicators, correlations among them, and their changes through time for each country in the sample. Rankings based on different indicators, and their changes will provide measures of stock market development.

In addition to documenting stock market development using traditional measures, it is important to understand some of the basic empirical features of emerging stock markets. These include, for example, the return and variances of the stock markets over time, data on price/earnings ratios, the value and issuance of new equity shares, comovements of international capital inflows, domestic investment expenditures, and stock market price and volume movements, and simple correlations across international stock markets. The

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[3] For half of the countries for which IFC index is calculated, data on traditional indicators (for the index) are available starting from 1975; for the rest this information is available only from the mid-eighties. For most of these index-countries annual data on traditional indicators (calculated for the market) are available starting from 1976 (for Indonesia and Portugal information is available from 1977, and for Jordan from 1978 on).

[4] These non-index countries are Bangladesh, Costa Rica, Egypt, Indonesia, Jamaica, Kenya, Kuwait, Morocco, Peru, Sri Lanka, Trinidad and Tobago, and Uruguay. Annual market data for these countries are available starting from mid-eighties.

traditional measures of stock market development along with these illustrative statistics help describe empirically the emerging stock markets.

2. Institutional Indicators

In addition to traditional indicators, institutional aspects such as the underlying legal and accounting rules and regulations can also indicate how developed a stock market is. Developed stock markets generally have prudential supervisory bodies, information disclosure rules, internationally accepted accounting standards, low transaction costs, and short settlement times. The ease with which foreign investors can enter and exit the market, and the withholding taxes imposed on foreign capital gains and dividends also indicate how open the stock markets are. In some developing countries tax incentives are used in an effort to promote stock market development.

Some of these institutional indicators are available from the International Finance Corporation's Emerging Stock Markets Factbook. One problem with these indicators is that they tend to be qualitative and subjective in nature, which makes it difficult to do statistical analysis. However, it is possible to construct dummy variables of institutional indicators based on the information provided in the factbook. Table 3 reports certain institutional characteristics for a sample of countries as of end-1991.[5] Disclosure and accounting standards indicators capture transparency and the quality of information, whereas investor protection and securities commission variables capture the existence of regulation and supervision. Data on entry and exit restrictions and withholding taxes capture barriers to entry and exit. These institutional indicators are needed to augment the traditional indicators to provide a more complete description of the extent of stock market development.

Any analysis of a country's stock market begins with an understanding of how the market operates and the economic and regulatory environment, including, where possible, information on the composition of traders

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[5] This information is available for index-countries, from 1987 on.

(domestic/foreign/institutional), the characteristics of listed versus unlisted firms, the existence of restrictions, taxes, controls on foreign participants, and the concentration of trading (*Is* it only the top few companies that are significantly traded?). Given the vast array of institutional, tax, and regulatory differences, such a description will - by definition - be incomplete. Nonetheless, reviewing each country should help us identify special circumstances and policy changes that will improve the quality of the research. We will expand and incorporate institutional characteristics into an analysis to the extent possible. However, a very comprehensive analysis of the institutional aspects of each country is beyond the scope of this research.

3. Asset Pricing Indicators

3.a. Motivation

While the traditional and institutional measures of stock market development may be informative, each measure suffers from numerous conceptual problems, and each measure provides imperfect information on only one aspect of stock market development. For example, the ratio of market capitalization to GDP tells us the importance of the companies listed on the exchange, but this ratio does not provide information on the ease of conducting transactions or the efficiency with which assets are priced. Similarly, the turnover ratio, tells us how much trading goes on among listed shares, but this measure also does not provide information about the efficiency with which assets are priced or the degree of integration of domestic capital markets with international markets.

One way of circumventing these shortcomings with traditional and institutional measures is to use asset pricing models to construct conglomerate measures of stock market development. Asset pricing models offer a vehicle for providing a unified measure of stock market development that captures many of the intuitive notions of capital market development present in current policy discussions.

3.b. Non-Technical description

The Arbitrage Pricing Model will be the main asset pricing model that we use to compute measures of stock market development (We will also use the Capital Asset Pricing Model to compute stock market development measures).[6] Within the context of the Arbitrage Pricing Model (APM), there should be no arbitrage opportunities available in a well-developed, frictionless stock market. Therefore, different types of risk should be priced equally across assets within a country and, in the international version of the APM, across assets in different countries. According to the APM, if risk is not priced equally across assets, then arbitrage opportunities arise which are quickly eliminated by traders. If, however, there are frictions in the market that impede trading and effective information flow, then risk may be priced differently across assets within a country or across assets in different countries without this producing arbitrage opportunities. Thus, these frictions produce a "mis-pricing" of risk that can be measured by the APM. For example, Gultekin, Gultekin, and Penati (1989) and Korajczyk and Viallet (1989) find that capital controls increase the degree of mis-pricing measured by the APM. Since the extent of information availability, capital controls, taxation, transactions costs, and efficient information processing by participants will all be reflected in risk mis-pricing, asset pricing measures of the mis-pricing of risk represent useful conglomerate measures of stock market development.

The computed degree of mis-pricing within each domestic market can be an indicator of "*domestic asset pricing efficiency*." This has been done for stock markets in the United States, the United Kingdom, France and Japan, but testing the domestic pricing efficiency of developing country stock markets has not been the focus of much research. More developed stock markets will price risk more efficiently than less developed stock markets, so that,

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[6] The Arbitrage Pricing Model tends to perform better than the Capital Asset Pricing as discussed in Korajczyk and Viallet (1989).

domestic asset pricing efficiency measure can provide a useful summary of the level of stock market development.

One technical advantage of the specific methodology that we are using is that we will be able to compute a "number" that measures the degree of domestic asset pricing efficiency. This has two important implications. First, efficiency is a relative concept; markets are not efficient or inefficient they fall along a spectrum. Second, this estimated number representing domestic asset pricing can be used in regressions to examine the association between the degree of domestic asset pricing efficiency and other economic phenomena like financial intermediary development and the corporate financing decisions of firms.

The degree of mis-pricing for each developing country stock market can also be compared with the international stock market. This measure of stock market development is called "***international asset pricing efficiency***." Thus, stock markets where the price of risk is significantly different from the price of risk in the major stock markets (United States, Japan, France, United Kingdom, etc.) will have more mis-pricing, be viewed as less integrated in the world stock market, and will be considered to have lower international asset pricing efficiency than developing country stock markets that price risk the same as the world stock market. Development of measures of international asset pricing efficiency will also allow a comparison of the international integration of stock markets and the international integration of bond markets. The examination of bond market integration enjoys a much longer research tradition, and we will be able to complement that research with our measures of international integration (see, for example, Montiel (1992)).

These measures of domestic and international asset pricing efficiency can then be used to examine the relationship of stock market development with financial intermediary behavior, corporate financial decisions, the efficiency with which resources are allocated, and other features of financial and economic development. Since these measures of stock market development can be computed both cross-sectionally and intertemporally, they can be used to study

the response of the stock market to various policy changes in a single country or make comparisons across countries.[7]

3.c. More technical description

The research largely follows the analytical design of Korajczyk and Viallet (1989) while incorporating the econometric recommendations made by Shanken (1992). The basic assumption underlying the APM is that asset returns follow a linear factor model:

$$R_i = E(R_i) + b_{i1}f_1 + b_{i2}f_2 + \ldots + b_{ik}f_k + e_i$$

where R_i is the rate of return on asset i,[8] $E(R_i)$ is the expected rate of return on asset i, and b_{ij} is the sensitivity (beta) of asset i's returns to movements in the zero mean common factor f_j. The common factors capture each component of systematic risk, i.e., that risk that cannot be eliminated by holding a well-diversified portfolio. Risk-averse individuals will pay to avoid systematic risk. The final term e_i is the unsystematic risk component that is idiosyncratic to asset i, i.e., individuals will not pay to avoid unsystematic risk since it can be avoided by holding a diversified portfolio.

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[7] It is important to note that the APM is often rejected as a sufficient description of the pricing of assets in developing country stock markets. Since we are using the APM's pricing of risk as the definition of a perfectly well-developed stock market, there may be a bias in the measure of mis-pricing assigned to each country. For our purposes, however, the issue is the relative amount of mis-pricing. If, by using the APM instead of the "true" asset pricing model, we compute that country x has a mis-pricing value of 4 and country y has a mis-pricing value of 8 while "in reality" country x has a mis-pricing value of 2 and country y has a mis-pricing value of 4, this bias will not affect our conclusions, because country y's stock market is still twice as "under-developed" as country x's.

[8] Precisely, this the expected return on asset i above the risk free rate of return. Estimation procedures in the absence of a risk free return are discussed in Korajczyk and Viallet (1989).

The central finding of the APM, as derived by Ross (1976) and Roll and Ross (1980) under the assumption of no arbitrage, is that

$$E(R_j) = b_{j1}p_1 + b_{j2}p_2 + \ldots + b_{jk}p_k$$

where p_j is the risk premium on factor j, i.e., p_j is the price of systematic risk type j. If there are no trading restrictions and homogenous beliefs on the betas, then the price of risk must be the same across assets within the same country and across national boundaries or riskless arbitrage opportunities would exist that would allow arbitragers to make infinitely large profits while assuming no risk. Taxes, capital controls, information flow impediments, etc. will produce mis-pricing of the risk premia, where mis-pricing is defined as the p_j's being different for different groups of assets within the same country or different across national frontiers. Since the principle components procedure used by Korajczyk and Viallet (1989) permit the risk premia to vary over time, the computed measures of mis-pricing - and hence the computed measures of stock market development - can be used to compare countries or analyze a single country over time.

Korajczyk and Viallet (1989) use asymptotic principle components to construct between five and ten systematic risk factors and compute the degree of mis-pricing in four domestic markets (United States, United Kingdom, France, and Japan) and the degree of mis-pricing between each of these four domestic markets and a world stock market composed of the combination of these four domestic markets. We would expand this analysis to include the emerging stock markets data base. Although we would attempt to incorporate all 32 countries, data availability suggests that only the 20 countries (or even a subset of these countries) that compose the emerging stock markets index could ultimately be used.

From this analysis, the two computed stock market development indexes - the domestic asset pricing efficiency index and the international asset

pricing efficiency index - for each country would represent objective, unified measures of stock market development that would improve upon traditional and institutional measures. These indexes will provide a means for empirically defining stock market development and for investigating the linkages between stock market development, financial intermediary behavior, and corporate financial decisions.[9]

B. Stock Market and Financial Intermediary Development: A Theoretical Overview

1. Goal

After constructing stock market development indicators, compiling stylized facts using these stock markets, and describing the operation of developing country stock markets, this project will investigate the linkages between the development of the stock market and the growth and functioning of financial intermediaries. Although these stock market development indicators can and should be used to address a host of operationally meaningful questions, we plan to start this long-term research agenda by first improving our knowledge of the joint development of stock markets and financial intermediaries.

The natural place to look in the finance literature for a link between stock market and financial intermediary development is in the literature on corporate capital structures. The corporate finance literature is enormous, and it provides numerous insights into the economic incentives underlying the balance between using equity or debt to finance firm investments (see the survey by Harris and Raviv (1991)) and the discussion by Demirguc-Kunt (1992). That is, the corporate capital structure literature examines the determinants of the optimal debt-equity ratio for different types of firms. This literature, however, presupposes the existence of well functioning stock

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[9] Given uncertainties regarding the appropriate assets pricing model, we will also perform the computations using a multi-factor international capital asset pricing model. Also, we will include developed country stock markets in the sample and perform similar computations to check our results.

markets and financial intermediaries, as well as the existence of legal, regulatory, and supervisory structures that enforce the "rules of the game." Furthermore, the corporate finance literature is static; it does not focus on dynamic questions concerning the interactive effects of stock market development, financial intermediary changes, and economic growth. Put more broadly - and bluntly, the finance literature tends not to focus on how national financial structures evolve over time and how this evolution interacts with economic development and firm financing decisions. Since the very purpose of this research is to compute empirical indicators of the level of stock market development in order to characterize the interactions between stock market and financial intermediary development as economies develop, the static nature of most of the finance literature is not as directly applicable to the dynamic, policy-oriented issues that we want to investigate as we would like.

Thus, an important contribution of this research will be to produce a paper that provides a conceptual overview of the linkages between stock market and financial intermediary development. Given the under-developed nature of this part of the finance literature, this conceptual overview will necessarily be a preliminary sketch of important issues. Nevertheless, this overview will help organize a number of important questions. For example, in what ways might financial intermediaries be affected by stock market development, how might the financing decisions of firms be altered by a developing stock market, and through what channels will economic development influence a country's financial structure? This paper will certainly serve as a starting point for additional research into the interactions between the evolution of financial structures and economic growth. More importantly for the World Bank, the conceptual framework combined with the project's empirical documentation of the ties between stock market development, financial intermediary development, and corporate financing patterns will improve our ability to better design financial sector operations that promote economic development by improving the ability of the entire financial sector - the

conglomeration of intermediaries and markets - to simulate investment and efficient resource allocation.

2. Some Preliminary Ideas

As mentioned, the corporate finance literature studies the determinants of the optimal debt-equity ratio. Almost by definition, therefore, the corporate finance literature views debt and equity financing as substitutes. Thus, this literature yields the straightforward and intuitively appealing prediction that stock market development - where stock market development implies a lower cost of equity financing - would cause the optimal debt-equity ratio to fall. There may, however, be some countervailing complementarities between stock market development and debt financing (see, Seward (1990)).

When a closely held firm has a desirable project to finance that requires a large capital outlay, the owner will require a relatively high return to compensate for the risk of having a such a concentrated portfolio. This high return requirement implies that some relatively profitable projects will go unexploited because owners cannot effectively diversify risk. An efficient stock market, however, may allow the owner to diversify the risk of the project so that the project proceeds. Put in a more dynamic context, the better developed is the stock market, the easier it will be for owners to diversify risk so that more profitable projects are undertaken by society.

One consequence of this risk sharing characteristic of stock markets is that stock market development may actually increase the debt equity ratio. A better developed stock market will allow owners to diversify risk, so that they feel less constrained by diversifiable risk and therefore seek to undertake more projects. The stock market may, however, not be the source much new capital. The stock market may be a vehicle for diversifying risk, where the firm still uses banks or other financial intermediaries to finance the project. Banks and other financial intermediaries have advantages in terms of researching firms, monitoring managers, and evaluating projects while stock markets may have advantages in allowing owners to diversify risk. These

two types of financial services - information processing and risk diversification - may in fact be complementary services for investors. Thus, the leverage of firms may actually rise with a better developed stock market because the owners are more diversified.

There are other avenues also worth exploring. Stock markets, for example, frequently stimulate other types of risk pooling instruments like options, forward, and futures contracts. These instruments may instigate the birth of new financial intermediaries, credit agencies, and research firms, while also modifying the activities of existing institutions. Furthermore, these risk hedging instruments and new institutions may affect the behavior of firms and investors in ways that alter the incentives underlying debt and equity financing. These channels bear further thought and research.

C. Stock Markets, Financial Intermediaries, and Corporate Finance

1. Stock Market and Financial Intermediary Development: Stylized Facts

Using the traditional, institutional, and asset pricing based indicators of stock market development discussed above, this research will document the empirical relationship between stock market and financial intermediary development. We will not attempt to characterize the causal channels among various capital markets and different types of financial intermediaries. This research has the much more modest objective of establishing a robust set of stylized correlations among measures of stock market development and indicators of the level of development of different financial intermediaries.

An informative working paper by Pardy and Dong-He (1992) presents preliminary evidence along these lines. Using data on 32 developing countries over the 1984-1990 period, they summarize the relationship between one measure of stock market development - the ratio of market capitalization to GDP - with three measures of financial intermediary development - the ratio of M1 to GDP, the ratio of M2 minus M1 to GDP, and the ratio of credit to the private sector

to GDP. Their results are reproduced in Table 4. The results are consistent with three propositions: (1) countries with more developed stock markets also have more "financial depth" as defined by the ratio of M2 minus M1 to GDP or the ratio of M1 to GDP; (2) countries with more developed stock markets have financial systems that issue more credit to the private sector as a share of GDP than countries with less well developed stock markets; and (3) richer developing countries - as defined by GDP per capita - have more developed stock markets - as defined by the market capitalization to GDP ratio - than poorer countries.

Our research will extend this analysis in three ways. First we will expand the set of stock market development indicators to include (1) the turnover ratio, which equals the value traded divided by market capitalization, (2) the ratio of value traded to GDP, (3) the measure of domestic asset pricing efficiency (as defined in the last section), and (4) the measure of integration into international stock markets (as defined in the last section). These additional stock market development indicators will permit a more accurate characterization of the empirical ties between stock market and financial intermediary development.

The second way in which we will improve the analysis of the relationship between stock market and financial intermediary development is to expand the set of indicators of financial intermediary development. Recent research by King and Levine (1993a,b) suggest a number of additional - albeit still flawed - measures of the importance of specific financial intermediaries and groups of financial intermediaries. Specifically, we will use (1) the ratio of deposit money bank credit to GDP as an indicator of the size of banks in the economy, (2) the ratio of deposit money bank credit to bank credit plus central bank credit as an indicator of the importance of banks relative to the central bank, (3) the ratio of non-bank financial intermediary assets to GDP as a measure of the importance of financial intermediaries other than banks in the economy, and (4) we will examine each country's financial structure to discover particular types of financial intermediaries that may play especially

important roles in providing financial services to capture country specific institutional arrangements. This enlarged set of financial intermediary development indexes along with the augmented set of stock market development indicators should enhance our ability to document the linkages between stock markets and intermediaries as countries develop.

Finally, in addition to examining the cross-country relationships among the expanded set of stock market and intermediary indicators averaged over the 1978-1992 time period, we will examine the relationship among these indicators over time while looking for particular policy changes in individual countries. For example, policies initiatives designed to encourage stock market or financial intermediary development during the middle of the sample period offer opportunities to see how the relationship between stock market and financial intermediaries changed after the policy changes. This approach will allow us to shed some light on questions such as, when country x enacted stock market development policies in 1985 what happened to the stock market and financial intermediaries afterwards"?

2. Stock Market Development and Financing Patterns of Corporations

This part of the research seeks to investigate the impact of emerging stock markets on the financing patterns of developing country corporations. How is the debt-equity ratio of firms affected as stock markets develop and firms raise capital through new issues? Are debt and equity finance complements or substitutes?

Why should debt and equity finance be substitutes? A widely publicized, popular reason for developing stock markets is the possibility that an active stock market may result in increased competition for commercial banks in providing financing. As stock markets develop, cost of equity decreases and corporations switch from debt to equity financing.

However, debt and equity finance can also be complements. The more developed stock markets are, the easier it is for individuals to price and diversify risks. This allows them to undertake projects that would not have

been feasible without a developed stock market. However, the source of new capital needed to finance these additional projects is not necessarily the stock market. The stock market may facilitate risk diversification whereas the firm still finances the project through banks and other financial intermediaries. In this case, a more developed stock market would also increase borrowing, in the form of bonds, commercial paper, bank debt, etc.

It is possible to investigate empirically the relationship between stock market development and financing pattern of corporations in developing countries. As discussed earlier, corporate finance literature provides numerous theories to explain the determinants of the optimal debt-equity ratio of institutions. However, since these theories are developed to model capital structure determinants in developed countries, they are mostly silent as to how an emerging stock market would impact on the financing pattern of corporations. Nevertheless, capital structure theories determine the key factors that need to be controlled in exploring the relationship between capital structure and stock market development.

Using firm-level corporate structure data assembled by IFC (Singh et al.,1992) and utilizing the stock market indicators developed in the first part of the study, we analyze the impact of emerging stock markets on financing patterns of developing country corporations. Unfortunately, it is not possible, except in a few cases, to distinguish between debt issued by banks and debt sold in capital markets. The following regression equation can be used to test the impact of stock market development on leverage:

$$D/E = \alpha F + \beta S + e$$

where D/E is the debt-equity ratio, F is a vector of leverage determinants identified by the capital structure literature, such as size, growth, firm maturity, firm cash flows, investment opportunities, profitability, bankruptcy costs.[10] S is a vector of stock market indicators-traditional, institutional, and asset pricing- developed in the first part of this

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[10] A complete list of these determinants are given in Harris and Raviv (1991).

research. α and β are the corresponding vectors of coefficients, and e is the error term.

Controlling for all other relevant factors captured in F, a positive correlation between the extent of stock market development and firm leverage, i.e., positive and significant β coefficients, would indicate complementarities. A negative correlation, i.e., negative and significant β coefficients, would support the view that debt and equity finance are substitutes. Finally, if the stock market indicators fail to develop significant coefficients, this means that either they do not capture the extent of stock market development sufficiently, or that stock market development leaves financing patterns of developing country institutions unaffected.

It is important to emphasize that examining the relationship between firm debt/equity ratios and stock market development pushes beyond existing theory. This has dangers in that we do not have preexisting stock of models to guide this study. Empirically, corporate financing decisions are extremely difficult to understand within a single country, attempting to compare corporate financing decisions across countries is fraught with even more dangers. Thus, empirical work in this vein will, at best, be suggestive.

Demirgüç-Kunt (1992) conducts a preliminary analysis of the issue for a sample of eight countries using data averaged over time and firms. The data are obtained from Singh et al. (1992), as published in their tables. The sample consists of eight countries and cover the eighties. Capital structure variables are the median values for each country's sample period.

Table 5 reports some stylized facts on capital structures and emerging stock markets used in the analysis. Leverage, defined as the long term debt to equity ratio, shows wide variations among countries, from 8.7 percent for Malaysia to 163.5 percent for Thailand. The breakdown of financing to internal and external (equity and debt) finance shows that developing countries rely on external finance, especially on equity finance, to a great extent. In developed countries corporate growth is mostly financed

internally through retained earnings. However, according to figures in Table 5, a median company in Turkey, Mexico, and Jordan appears to have financed 60, 76, and 84 percent of its growth from equity issues, respectively.

A cursory look at the data reveals an interesting pattern. It appears that countries with more active stock markets have greater leverage (defined as long-term debt to equity ratio). This correlation is further analyzed within a regression analysis, holding other factors that may affect leverage constant.

The results are reported in Table 6. Controlling for firm size, net asset growth, profitability, and price earnings ratio, stock market development indicators produce significant and positive coefficients. These results suggest that debt and equity finance are complements. However, these results are very preliminary. The data used are aggregate and averaged over the sample period. The variables included do not control for all relevant factors completely. Only crude stock market indicators are used. This research intends to improve on all these points. Firm level, time-series data compiled by IFC will be used. At present firm-level data are available for the top 50 listed companies in manufacturing in eight countries (countries and sample periods are listed in Table 5). However, IFC is in the process of expanding this data set and information on more firms and countries will be available by the end of this fall. Control variables will also be obtained from this data set. One crucial variable is the tax-incentives to encourage debt and/or equity financing, which will be obtained from country economists, or the countries themselves. Information on directed credit policies will also be incorporated. Stock market indicators that capture the extent of development will also be refined. Traditional, institutional, as well as asset pricing indicators developed in the first part of this research will be incorporated. Finally, different definitions of leverage - such as short-term, long-term, total- will be analyzed.

IV. SUMMARY AND CONCLUSIONS

In recent years World Bank programs aimed at developing capital markets, particularly stock markets, have been receiving increasing attention. However, there is not much work in the existing literature to help measure the level of stock market development, and thus the success of these programs. Nor do we clearly understand how this development effects the functioning of financial intermediaries and the rest of the economy.

The purpose of this paper is two-fold. First, it presents the results of some preliminary research on these issues. Second, and more importantly, it outlines a broader research agenda and discusses the relevance of these issues for World Bank operations.

The research project outlined in this paper will improve our understanding of the role of stock markets in financial sector development by (1) constructing measures - and therefore criteria - of stock market development, (2) relating these measures to the development of financial intermediaries, and (3) evaluating how stock market development influences firm financing decisions.

First, constructing measures of stock market development has a number of immediate and long-term uses. Measures of stock market development quantify the level of development and help gauge improvements in the stock market. Indicators of stock market development will allow analysts to monitor the evolution of a country's stock market and provide a criteria for assessing the degree to which policies designed to improve the stock market have succeeded. In the longer-run, these indicators will facilitate more research on how the financial sector influences economic development. This research agenda does not exploit all of the uses of these indicators. Future research will be needed to further develop the links between stock market development and real economic activity.

Second, using purely descriptive statistics, we will illustrate the co-development of stock markets, banks, mutual funds, pension funds, and other

non-bank financial intermediaries. This will allow us to address questions such as does the role of banks in the economy become less important as stock markets develop, or are there complementarities between banks and stock markets so that banks flourish as stock markets develop? Similarly, we will document the evolution and interactions among stock markets and pension funds, mutual funds, and other non-bank financial intermediaries. This documentation will represent a first step toward truly characterizing financial sector development. We will also investigate the linkages between stock market and financial intermediary development conceptually. Both the empirical and conceptual work of this section will (1) enrich our comprehension of financial sector development and (2) augment our ability to dissect the mechanisms via which the services provided by financial markets and institutions affect and are affected by economic activity.

Third, we will focus on how the financing pattern of firms changes as stock markets develop: as stock markets develop and firms raise more capital by issuing shares, will the debt-equity ratio of firms fall, or will borrowing also increase, so that the debt-equity ratio either remains constant or rises? Combining the firm data recently assembled by Singh, et. al. (1992), IFC's Emerging Markets stock market data, and the measures on stock market development constructed in the first part of this research project, we will examine how stock market development influences the composition of corporate financing. Improving our understanding of the link between stock market development and corporate financing will more than improve our comprehension of the interactions between stock market development and intermediary activities. Dissecting the relationship between stock market development, intermediary behavior, and corporate financing decisions marks an important step toward more fully understanding how the process of financial sector development affects investment and efficiency at the firm level, implying a more precise view of how financial services affect economic development.

Despite the importance of all these issues to the World Bank, they have not received much attention by researchers. We will address these important but neglected questions within the research project outlined in this paper.

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Table 1. Emerging Stock Markets -- Traditional Indicators

Country	Number of Listed Companies	Market Capitalization (in mil. US$)	Value Traded (mil. US$)	Turnover Ratio (in %)	Market Capitalization/GDP	Value Traded/GDP
Latin America						
Argentina	182	5943	222	2.9	.019	.0008
Brazil	583	35879	1305	3.8	.079	.0029
Chile	213	14142	94	0.6	.449	.0031
Colombia	83	1610	11	0.7	.033	.0002
Mexico	201	37924	1393	3.6	.126	.0047
Venezuela	64	4669	135	2.0	.081	.0022
Asia						
India	2383	33412	1568	5.0	.110	.0055
Indonesia	116	6989	286	4.6	.059	.0025
Korea	591	99127	7747	8.3	.443	.0349
Malaysia	265	40523	671	1.6	.931	.0155
Pakistan	455	3288	30	0.8	.074	.0006
Philippines	163	12392	173	1.4	n.a.	n.a.
Thailand	187	22345	1793	7.4	.259	.0185
Europe/Middle East/Africa						
Greece	123	9778	151	1.3	.128	.0021
Jordan	104	2258	43	1.9	.506	.0089
Nigeria	119	1206	1	0.1	.035	.00002
Portugal	174	8703	168	1.9	.174	.0027
Turkey	81	9710	361	2.8	.091	.0029
Zimbabwe	56	1336	4	0.3	.205	.0006

The reported values are means for the period 1988-1992. GDP-deflated means do not include 1992 observations. Data are from Emerging Markets Data Base, International Finance Corporation.

Table 2a. Emerging Stock Markets -- Rankings Based on Traditional Indicators

Country	Number of Listed Companies	Market Capitalization (in mil. US$)	Value Traded (mil. US$)	Turnover Ratio (in %)	Market Capitalization/GDP	Value Traded/GDP
Latin America						
Argentina	10	7	10	12	1	5
Brazil	16	15	14	14	6	11
Chile	13	12	6	4	16	12
Colombia	4	3	3	3	2	2
Mexico	12	16	15	13	10	13
Venezuela	2	6	7	10	7	7
Asia						
India	18	14	16	16	9	14
Indonesia	6	8	11	15	4	8
Korea	17	18	18	18	15	18
Malaysia	14	17	13	7	18	16
Pakistan	15	5	4	5	5	4
Thailand	11	13	17	17	14	17
Europe/Middle East/Africa						
Greece	8	11	8	6	11	6
Jordan	5	4	5	9	17	15
Nigeria	7	1	1	1	3	1
Portugal	9	9	9	8	12	9
Turkey	3	10	12	11	8	10
Zimbabwe	1	2	2	2	13	3

Rankings are based on the values of Table 1. A higher rank indicates a stock market that is relatively more developed.

Table 2b. Emerging Stock Markets -- Rankings Based on Traditional Indicators

Ranking	Number of Listed Companies	Market Capitalization	Value Traded	Turnover Ratio	Market Cap./GDP	Value Traded/GDP
1	Zimbabwe	Nigeria	Nigeria	Nigeria	Argentina	Nigeria
2	Venezuela	Zimbabwe	Zimbabwe	Zimbabwe	Colombia	Colombia
3	Turkey	Colombia	Colombia	Colombia	Nigeria	Zimbabwe
4	Colombia	Jordan	Pakistan	Chile	Indonesia	Pakistan
5	Jordan	Pakistan	Jordan	Pakistan	Pakistan	Argentina
6	Indonesia	Venezuela	Chile	Greece	Brazil	Greece
7	Nigeria	Argentina	Venezuela	Malaysia	Venezuela	Venezuela
8	Greece	Indonesia	Greece	Portugal	Turkey	Indonesia
9	Portugal	Portugal	Portugal	Jordan	India	Portugal
10	Argentina	Turkey	Argentina	Venezuela	Mexico	Turkey
11	Thailand	Greece	Indonesia	Turkey	Greece	Brazil
12	Mexico	Chile	Turkey	Argentina	Portugal	Chile
13	Chile	Thailand	Malaysia	Mexico	Zimbabwe	Mexico
14	Malaysia	India	Brazil	Brazil	Thailand	India
15	Pakistan	Brazil	Mexico	Indonesia	Korea	Jordan
16	Brazil	Mexico	India	India	Chile	Malaysia
17	Korea	Malaysia	Thailand	Thailand	Jordan	Thailand
18	India	Korea	Korea	Korea	Malaysia	Korea

Rankings are based on the values of Table 1. Emerging markets are ranked from less developed to more developed.

Table 2c. Emerging Stock Markets -- Correlations Among Traditional Indicators

	Market Capitalization	Value Traded	Turnover Ratio	Market Capitalization/GDP	Value Traded/GDP
Number of Listed Co.	.360 (.142)	.287 (.248)	.361 (.140)	-.048 (.850)	.138 (.583)
Market Capitalization		.932 (.000)	.712 (.001)	.411 (.089)	.847 (.000)
Value Traded			.775 (.000)	.246 (.324)	.881 (.000)
Turnover Ratio				.061 (.809)	.740 (.000)
Market Cap./GDP					.584 (.011)

P-values are given in parentheses.

Table 3. Emerging Stock Markets -- Institutional Indicators

Country	Regular Publication of P/E yield (1)	Accounting Standards (2)	Investor Protection (3)	Securities Commission (4)	Restrictions (5)			Withholding Taxes (6)	
					dividend	capital	entry	capital gains	dividend
Latin America									
Argentina	0	1	1	1	0	0	0	36	17.5
Brazil	1	2	2	1	0	0	0	25	25
Chile	1	2	2	1	0	1	0	10	10
Colombia	0	1	1	1	1	0	0	30	0
Mexico	1	2	2	1	0	0	0	0	0
Venezuela	0	1	1	1	1	1	0	0	20
Asia									
India	1	2	2	1	1	1	1	40	25
Indonesia	1	0	1	1	1	1	0	20	20
Korea	1	2	2	1	0	0	1	0	25
Malaysia	1	2	2	0	0	0	0	0	0
Pakistan	0	1	1	1	0	0	0	0	15
Thailand	1	1	1	1	0	0	0	25	20
Europe/Mideast/Africa									
Greece	1	0	0	0	1	1	0	0	42
Jordan	0	0	1	1	0	0	0	0	0
Nigeria	0	1	1	1	1	1	2	20	15
Portugal	1	1	1	1	0	0	0	0	25
Turkey	1	1	0	1	0	0	0	0	0
Zimbabwe	0	1	1	1	1	1	1	30	20

Column (1) 0=published, 1=comprehensive and published internationally; Columns (2) and (3), 0=poor, 1=adequate, 2=good, of internationally acceptable quality; Column (4), 1=functioning securities commission or similar government agency, 0=no agency; Column (5), 0=free, 1=some restrictions, 2=restricted; Column (6) withholding tax rates, given in percentages. All data are as of end-1991. The table is based on the information provided in the IFC's Factbook.

Table 4

Correlation between Stock Market Capitalization and Financial Indicators

	Market Capitalization
M1/GDP	0.36 (0.03)
(M2 - M1)/GDP	0.69 (0.01)
Credit to Private Sector/GDP	0.83 (0.01)
GDP/Capita	0.55 (0.01)

Correlation
(P-values in parentheses)

Table 5. Capital Structure in Developing Countries and Emerging Stock Markets.

Country	LTD/E (in %)	Internal Financing of growth (%)	External Financing of Growth		Number of Listed Co.	Market Capitalization (in mil. of US $)	Trading Value (in mil. of US $)	Turnover Ratio (in %)
			Equity (%)	Debt (%)				
Thailand (1983-87)	163.5	17.3	n.a.	n.a.	214	23,896	4,334	18.5
Korea (1980-87)	116.7	12.8	40.3	45.4	669	110,594	22,664	22.2
India (1980-88)	46.1	36.1	11.0	45.6	2435	38,567	5,680	12.6
Turkey (1982-87)	26.6	18.1	60.5	15.5	100	19,065	1,531	6.7
Pakistan (1980-86)	24.5	58.3	12.3	16.1	487	2,850	58	2.0
Mexico (1984-88)	12.5	17.1	76.0	2.9	199	32,725	2,705	8.9
Jordan (1980-87)	12.3	5.8	84.1	16.4	105	2,001	37	1.8
Zimbabwe (1980-87)	9.7	58.5	43.0	0.0	57	2,395	15	0.7
Malaysia (1983-87)	8.7	42.4	31.4	2.1	282	48,611	1,798	4.1

Source: Demirgüç-Kunt (1992).

Notes: Variable definitions are given in Demirgüç-Kunt (1992) appendix Table A1. The leverage data are obtained from the Economics Department of International Finance Corporation, as published in Singh et al. (1992). Capital structure variables are the median values averaged over the sample period. Emerging stock market data are obtained from IFC's Emerging Markets Data Base and are as of 1990, Quarter IV.

Table 6. Leverage Regressions and Stock Market Characteristics: Relative Explanatory Powers of Turnover Ratio, Trading Value, and Market Capitalization.

RHS variables	Alternative Specifications (1)	(2)	(3)	(4)
constant	-11.04 (26.26)	24.57 (35.97)	-43.13 (75.87)	103.78** (33.04)
size dummy	2.91 (4.70)	-1.49 (6.67)	0.38 (7.43)	3.91 (7.70)
net asset growth	-2.09* (1.03)	-0.81 (1.49)	0.87 (1.52)	3.22** (1.10)
profitability EBT/NA	2.10 (1.52)	-1.56 (1.83)	-3.62 (1.87)	-6.38** (1.48)
P/E	-0.22 (0.60)	-2.60** (0.81)	-2.61** (0.95)	-1.76# (0.91)
Turnover ratio	7.64** (6.82)			
Trading value		15.55** (4.47)		
Market capitalization			17.40* (8.20)	
Summary statistics				
no. of obs.	32	32	32	32
R^2	.80	.62	.53	.45

Source: Demirgüç-Kunt (1992).

Notes: The dependent variable is leverage (LTD/E). Standard errors are given in parentheses. Superscripts **, *, # indicate significance levels at one, five and ten percents respectively. The sample includes Thailand, Korea, India, Turkey, Pakistan, Jordan, Zimbabwe, and Malaysia. For each country, time series averages for four size groups are included. Variable definitions and data are given in Demirgüç-Kunt (1992) appendix Tables A1 and A2.

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